

DETAILED ACTION

1. This application is a 371 of PCT/NZ04/00124 filed 06/17/2004, which claims priority to NEW ZEALAND 526561 filed 06/18/2003.

Claims 1-17 are pending.

Response to Restriction Election

2. Applicant's election of Group I and the species: [4{2-(N-Methylpyridin-4(1H)-ylidene)ethenyl}-3-cyano-5,5-dimethyl-2(5H) furanylidene}]propanedinitrile, reading on claims 1-3, 6, 9, and 16 in the reply filed on April 28, 2010 is acknowledged. The election was made with traverse, and the examiner finds the arguments unpersuasive. The traversal is on the grounds that the restriction requirement failed to show burden, distinctness and lack of unity ala *In re Weber*. In the first instance for applications filed under the Patent Cooperation Treaty (PCT) and no finding of search burden or classification of the inventions is needed. The applicant has cited *In Re Weber* 198 USPQ 328, to suggest that the examiner has rejected the claims under 35 U.S.C. § 121, however no claims were rejected in the restriction requirement. While the *Weber* court uses the phrase "unity of invention" this is not the same "unity" referred to in the Patent Cooperation Treaty. The facts of *Weber* differ markedly from the finding of "lack of unity" in the instant case. In *Weber*, the examiner rejected the claims under 35 U.S.C. § 121, however in this case no rejections were made. Chapter 800 of the MPEP governs restriction practice and Chapter 1800 discusses rules and regulations governing the treatment of applications filed under the PCT. Even if the examiner were to follow U.S. restriction practice under 35 U.S.C. § 121, the claims are drawn to distinct inventions in different classes and

subclasses creating an undue search burden. The restriction requirement is made FINAL. As detailed in the following rejections, the generic claim encompassing the elected species was not found patentable. Therefore, the provisional election of species is given effect, the examination is restricted to the elected species only, and claims not reading on the elected species are held withdrawn.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because, the inventors have signed separate oaths with less than the full number of inventors listed. See 37 C.F.R. 1.45:

§ 1.45 Joint inventors.

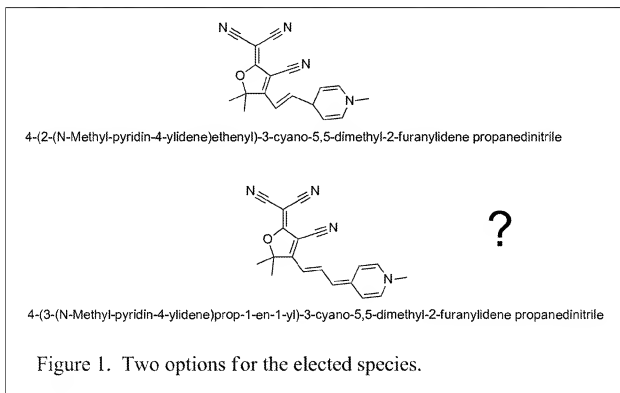
(a) Joint inventors must apply for a patent jointly and each must make the required oath or declaration: neither of them alone, nor less than the entire number, can apply for a patent for an invention invented by them jointly, except as provided in § 1.47.

While the inventors may sign separate copies, all inventors must be listed on each copy of the oath. Applicant is now required to submit a substitute declaration or oath to correct the deficiencies set forth above.

Objections

4. The specification and claim 9 are objected to for inconsistencies in nomenclature. The elected species for example is named [4{2-(N-Methylpyridin-4(1H)-ylidene)ethenyl}-3-cyano-

5,5- dimethyl-2(5H) furanylidene)]propanedinitrile which appears in the specification on page 21 and is drawn out on page 30. According to the drawing in the specification this compound has three carbons linking the furan to the pyridine, i.e. where L is 1 on page 30, compound 1a. If the structural drawing is correct, then the name should be “4-(3-(N-Methyl-pyridin-4-ylidene)prop-1-en-1-yl)-3-cyano-5,5-dimethyl-2-furanylidene propanedinitrile”. This is shown in Figure 1 below:



Ordinarily the experimental procedure would make this clear, however the procedure on page 21 doesn't list the starting materials in the synthesis. Based on claim 1 it would appear to be a 3 carbon linker, however claim 9 doesn't depend from claim 1. Such an error can be corrected provided that there is not "reasonable debate" as to what the correct text would be, *Novo Industries, L.P. vs. Micro Molds Corp.*, 350 F.3d 1348, 69 USPQ2d 1128 (2003). In such a

case, one must show that one of ordinary skill in the art would have been able to determine for sure what was intended, Ex parte Brodbeck, 199 USPQ 230. Similarly, MPEP 2163.07 states that correcting an error without introducing new matter requires "one skilled in the art would not only recognize the existence of error in the specification, but also the appropriate correction." Since the ethenyl compounds would not be conjugated unless charged the compound would appear to be the propenyl derivatives.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3, 6, and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "optionally substituted chain...which together with the double bond linking D to L forms a conjugated polyenic chain" is indefinite. While the claim does not say what the scope of the "optionally substituted" actually is, the specification on pages 12-13 discusses substituents by example using only an R in some instances (an R which is not defined, line 5, page 13). This section also makes reference to substituents forming "cyclic structures" and goes on to describe various cycloalkyl structures and thiophene compounds. The definitions conflict with the definition of L as a "conjugated polyenic chain", i.e. a chain is not a ring. Moreover the formula VII has more carbons, i.e. 10 than allowed by the claim. The definitions of IX, X, and XI appear to be structurally incomplete, i.e. the X moiety is undefined (halogen?) and would also violate the claimed definition, i.e. the bithiophene linker XI has 11

carbons. The endless permutations of the claim language forming rings with an incomplete list of atoms in unspecified places is such that the full scope cannot be ascertained. It is suggested that more precise definitions from the specification be placed in the claims.

Claim Rejections – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

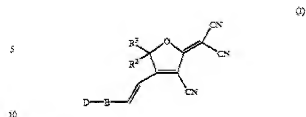
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3, 6, 9, 16, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. 6,393,190 (cited on the AND Abbotto et. al. "VERY LARGE SECOND ORDER NON-LINEAR OPTICAL ACTIVITY SHOWN BY HETEROCYCLE-BASED DICYANOMETHANIDE ZWITTERIONS" Mat. Res. Soc. Symp. Proc. Vol. 488, 1998, 819-822.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- A) Determining the scope and contents of the prior art.
 - B) Ascertaining the differences between the prior art and the claims at issue.
 - C) Resolving the level of ordinary skill in the pertinent art.
 - D) Considering objective evidence present in the application indicating obviousness or nonobviousness.
- A) **Determining the scope and contents of the prior art:**

U.S. '190 teaches tricyano optophore compounds for materials of the following formula from column 2:



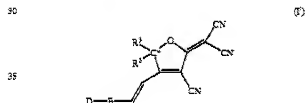
wherein:

D is an electron donating group;

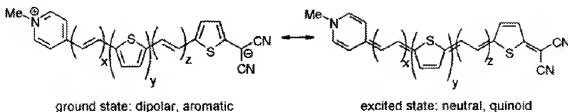
B comprises at least one bivalent ring; and

15 R^2 and R^3 each, independently, are selected from the group consisting of substituted or unsubstituted C_1-C_{10} alkynyl, substituted or unsubstituted C_2-C_{10} alkynyl, substituted or unsubstituted aryl, substituted or unsubstituted alkylaryl, substituted or unsubstituted carbocycle, substituted or unsubstituted heterocycle, substituted or unsubstituted cyclohexyl, and $(CH_2)_n-$
20 $O-(CH_2)_n$, where n is 1-10. Alternatively, R^2 and R^3 can be selected from substituted or unsubstituted C_1-C_{10} alkyl, provided that: when R^2 and R^3 are both selected from substituted or unsubstituted C_1-C_{10} alkyl the following condition is also met: R^2, R^3 . More preferably, chromophores of the invention have Formula I:

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Abbotto et. al. teaches similar compounds that use instead of a furan a thiophene linking the dicyanomethylene group to a pyridine ring as shown below:



Abbotto described the compounds in the following way “In this set the azinium ion is the acceptor and the donor a dicyanomethanide unit; spacer groups are either ethylenic or 2,5-thienylene fragments.” The spacer group being analogous to the linker of the instant claims.

B) Ascertaining the differences between the prior art and the claims at issue.

The compounds of the instant claims differ from U.S. ‘190 by the choice of the B-D, moiety on the furanyl ring, i.e. the specific heterocycles of instant claim D, pyridine of the instantly elected species. The compounds of the instant claims differ from those of Abbotto by the replacement of the thiophene linking moiety with the furan group of U.S. ‘190.

C) Resolving the level of ordinary skill in the pertinent art: The level of ordinary skill is high. Someone preparing these compounds would be trained in organic chemistry and would recognize the very close structural similarity and would expect them to have similar properties.

D) Considering objective evidence present in the application indicating obviousness or nonobviousness: The compounds of the claims at hand are analogs of old compounds, differing from U.S. ‘190 only by the choice of the B-D group, a group taught by Abbotto et. al. (i.e. N-methyl pyridine). One of ordinary skill would be motivated to make the compounds of the invention because he would expect the compounds to have similar properties, indeed we see that these have the same properties as those described by both U.S. ‘190 and Abbotto. Furthermore the teaching of Abbotto states in the conclusions that “The found second order non-linear optical

activities of systems 2 - 6 are among the highest so far reported in the literature. Values are particularly high for 5 and 6, for which the $p43(0)$ values are not only nearly 30 times larger than that of the commonly used NLO standard DANS [6], but even greater than those obtained very recently either for similar, highly conjugated, systems [6], or for comparable derivatives containing strong sophisticated heterocyclic acceptors [9].” The fact that Abbotto achieved very good results over conventional NLO materials with the pyridine based systems is a very good reason to use it the furan based system of U.S. ‘190.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David K. O'Dell whose telephone number is (571)272-9071. The examiner can normally be reached on Monday-Friday 9:00 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JANET ANDRES can be reached on (571)272-0867. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/David K. O'Dell/
Examiner, Art Unit 1625